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Original Article

The effect of improved food composition data on intake estimates in the United States of America

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Abstract

The effect of improved food composition data on nutrient intake estimates was determined by re-analyzing dietary intake data from the Continuing Survey of Food Intake by Individuals (CSFII) 1994–1996, 1998 with the multi-year version of the Food and Nutrient Database for Dietary Studies (FNDDS) 1.0, wherein only the data improvements such as those due to new analytical data replaced the older values. Mean differences between the old and revised estimates were determined. Improved data resulted in minor but statistically significant ($P = 0.001$) differences in mean intake estimates for most nutrients. Nutrients or food components with greatest differences included vitamin C, riboflavin, magnesium, and caffeine. As a result of these changes, 4–7% more adults have inadequate intakes of vitamin C and magnesium. Caffeine intakes were lower by about 25%. Changes in the food composition values for fluid milk, tomatoes, coffee, and mixed dishes appear to have had the most impact. These artifactual changes require adjustments to the earlier intake estimates to improve comparability with more current intakes.

Keywords: Food composition data; Nutrient intakes; Data improvements; Trends Analysis system; Food and Nutrient Database for Dietary Studies (FNDDS); Multi-year FNDDS; Continuing Survey of Food Intake by Individuals (CSFII)

1. Introduction

Food composition databases are essential for the analysis of dietary intake data to derive energy and nutrient intake estimates for population groups. The reliability of the dietary intake estimates and, hence, determinations regarding diet–health relationships are dependent on the quality of the food and nutrient database used. The database must be comprehensive and representative of foods consumed in the study population (Burlingame, 2003; Leclercq et al., 2001). To ensure that food consumption analyses are meaningful, the database must be continually updated to reflect changes in the food supply and improvements in the estimation of nutrient composition.

The Food Surveys Research Group (FSRG) of the United States Department of Agriculture (USDA) maintains the food and nutrient database for use with nationwide dietary intake surveys in the US. The Survey Nutrient Database (SNDB) as prepared for Continuing Survey of Food Intake by Individuals (CSFII) 1994–1996, 1998 (US Department of Agriculture, 2000) was also used for processing and analysis of the National Health and Nutrition Examination Survey (NHANES) 1999–2000. In 2004, the SNDB was updated, redesigned, renamed and released as the Food and Nutrient Database for Dietary Studies (FNDDS), 1.0 (US Department of Agriculture, 2004b). It was used for analysis of the latest *What We Eat In America* (USDA-NHANES 2001–2002). The FNDDS is a subset of the multi-year database maintained at USDA and a component of the USDA's Trends Analysis System. The system was designed to track changes in foods and facilitate analysis of intake trends in the US. It also categorizes real changes in the US food supply versus data improvements. Improved values replace the older values, whereas new data representing real changes in foods are time-stamped, with multiple records existing for those foods. Categorizing changes allows for more accurate comparisons of food and nutrient intake data. The data

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improvements need to be applied retroactively to dietary intake data collected in earlier surveys if comparisons to current intakes are to be made (Anderson et al., 2001).

The majority of the data improvements in the food composition values in the FNDDS, 1.0 were the result of improved data generated by the National Food and Nutrient Analysis program (NFNAP) conducted by Nutrient Data Laboratory, USDA. NFNAP was designed to generate improved and nationally representative nutrient estimates of foods identified as contributing the most to 75% of the consumption of any nutrient. About 1000 foods have been targeted for analyses (Pehrsson et al., 2003).

The primary purpose for this study was to determine the effect of improved food composition data on national intake estimates. The dietary intake data from CSFII 1994–1996, 1998 were re-analyzed to adjust for data improvements in food composition values and differences in intake estimates for different gender/age groups were examined. For selected nutrients, the changes in the proportion of the population with inadequate intakes were also determined, and the contribution of food groups to changes in total daily intake was also evaluated.

2. Methods

Data presented here are based on 24-h recalls from 21,159 individuals compiled from the CSFII 1994–1996, 1998. Two non-consecutive 24-h recalls were collected during in-person interviews of persons from all ages during 1994–1996 and of children age 9 and under in 1998. The design and methodology of the survey are detailed elsewhere (Tippett and Cypel, 1998; US Department of Agriculture, 2000). Foods and beverages consumed by the survey participants were matched to items in the CSFII food coding database and assigned the corresponding eight-digit food codes. Default recipes used to calculate the nutrient content of mixtures were used in this study. Recipe modifications used in the original analysis of the survey to match respondents' own recipes more closely were not used in this study because prior research has shown that the modifications did not have any significant effect on nutrient intakes (Ahuja et al., 1999). The SNDB for CSFII, 1994–1996, 1998 was used to produce nutrient intake values. Its main source of nutrient values was the USDA Nutrient Database for Standard Reference (SR), Release 11 (US Department of Agriculture, 1996), although it was updated for folate in 1998. Mean intakes were estimated for energy and 51 nutrients for which values were available in the SNDB using SAS version 8.02 (SAS, Cary NC) and SUDAAN (Research Triangle Institute, Research Triangle Park, NC). The results were weighted to produce national probability estimates for the US population. These were the old estimates, against which comparisons were made.

For this study the dietary intake information was re-analyzed with the multi-year version of the nutrient file of the FNDDS, wherein only the data improvements replaced the older values, and were applied retroactively. Revised portion weights, or real changes in nutrients due to changes in the food supply, were not applied in this study so as to separate the effect of improved food composition values. If comparisons of food and nutrient data over time need to be made, it will require recalculating portions of foods consumed with revised food weights.

About 40% of the nutrient values changed between the SNDB, 1994–1996, 1998 version and FNDDS, 1.0, due to data improvements The majority of the changes were the result of changes due to new analytical values from NFNAP, which have been incorporated into the USDA Nutrient Database for Standard Reference, Release 16-1 (US Department of Agriculture, 2004a), the source of nutrient values for the FNDDS. However, some of the nutrient changes resulted from revisions in the way nutrient values for the FNDDS codes were derived from the SR data. For example, the proportion of spaghetti to sauce was changed in several spaghetti dishes to include less sauce and more spaghetti. Revised, weighted mean intakes were estimated for energy and 44 nutrients for 23 gender/age groups. Revised intakes could not be estimated for some nutrients, namely vitamin A in International Units (IU), vitamin A in Retinol Equivalent (RE), carotene (RE), and vitamin E (ATE), as these nutrients are no longer being updated in the multi-year FNDDS. Differences in sodium intakes also could not be meaningfully interpreted in this study, because the original data included adjustments based on food preparation information not available in the CSFII data release. Moisture and alcohol have not been included in this study. Mean differences and percent differences between the old and revised estimates were determined for the rest of the nutrients, and tested for significance by the two-tailed student t test ($P = 0.001$).

Based on the size of differences between the old and revised estimates, the following nutrients/food components were identified for further evaluation—vitamin C, riboflavin, magnesium, potassium, and caffeine. Calcium was also included to study the impact of updated values for milk. For these six nutrients or food components, with the exception of caffeine, changes in the proportion of the population with inadequate intakes were evaluated. The Food and Nutrition Board (FNB) of the Institute of Medicine, National Academy of Sciences has recommended new approaches for assessing nutrient intakes of groups—adjusting the distribution of intakes for day-to-day variations and then determining the adequacy of intakes by using the probability approach or the estimated average requirement (EAR) cut-point method (Institute of Medicine, 2000; Murphy et al., 2002). Measures of within-person variation for the above nutrients were estimated using survey respondents 2-day intake data. These variation measures were then used to adjust intakes to develop usual intake distributions for different gender/age groups, using the Iowa State University method and the software C-Side version 1.02 (Iowa State University, 1996).

Pregnant and lactating women were excluded for these analyses. For vitamin C, riboflavin and magnesium the proportion of population below the EAR using the old and revised food composition values was determined. Changes in these proportions were evaluated. Calcium and potassium do not have an EAR, but instead have an adequate intake (AI). While Murphy et al. (2002) have cautioned against quantitative assessment of intakes for nutrients with an AI, a qualitative evaluation of adequacy of intakes is possible. Therefore, for calcium and potassium, changes in the proportions of population below the AI were determined for the purpose of qualitative evaluation.

To determine how changes in food composition values impacted the contribution of vitamin C, riboflavin, calcium, magnesium, potassium, and caffeine from different food groups, the following steps were taken: foods were grouped into 71 pre-defined food groups used in reporting of CSFII data (US Department of Agriculture, 2000); and the contribution of each food group to the intake of these nutrients with the old and revised nutrient data was estimated using SAS and SUDAAN. Mean differences between the two estimates were evaluated and tested for significance by the two-tailed student t test ($P = 0.001$).

Mean intakes are based on respondents' intakes on the first surveyed day, whereas contribution of nutrients/food components from different food groups, usual intakes, and proportion of population with inadequate intakes are based on respondents' 2-day-average intakes. The latter two analyses require two days of dietary data (Institute of Medicine, 2000). The 2-day average is used for reporting foods consumed, since it better represents an individual's usual intake of any one food, whereas mean intakes of nutrients are presented for the first surveyed day so that over time data users can compare day-1 intakes from surveys that include different numbers of days (Tippett and Cypel, 1998).

3. Results and discussion

Mean weighted daily intakes of energy and 44 nutrients or food components, for both the old and revised values, are presented for all individuals in Table 1. The difference between the two values, the significance of the difference, and the percent difference are also given. For most components, improved food composition data resulted in minor but statistically significant differences in mean intake estimates. Changes in food energy were minor and not significant; changes in proximates were also small but significant. Among the fatty acid classes, bigger changes were seen for saturated fatty acids, as compared to monounsaturated fatty acids and polyunsaturated fatty acids. For other nutrients or food components, the percent difference between the old and revised intake estimates ranged from −5.6% to 8.3%, except for caffeine and some individual fatty acids. Nutrients with greater differences within this range include vitamin C, riboflavin, and magnesium. Changes in food composition values had a big impact on caffeine intakes. Mean caffeine intake estimates were lowered by about 25%, from a daily intake of 175.8 to 31 mg. High relative differences were also observed for individual fatty acids such as gadoleic acid (20:1), erucic acid (22:1), palmitoleic acid (16:1), caprylic

Table 1
Mean nutrient intakes: old versus revised estimates[a]

Nutrients (unit)	Old	Revised	Difference[b]	% Difference
Food energy (kcal)	2010	2011	2	0.1
Protein (g)	75.2	74.9	−0.2#	−0.3
Total fat (g)	74.8	76.0	1.2#	1.5
Saturated fatty acids (g)	25.4	24.8	−0.6#	−2.4
Monounsaturated fatty acids (g)	28.9	28.5	−0.4#	−1.4
Polyunsaturated fatty acids (g)	14.8	15.0	0.2#	1.3
Cholesterol (g)	254	252	−2#	−0.8
Total Carbohydrate (g)	256	256	*#	−0.1
Dietary fiber (g)	15.1	15.0	−0.1#	−0.8
Vitamin C (mg)	101	95	−6#	−5.6
Thiamin (mg)	1.59	1.56	−0.04#	−2.3
Riboflavin (mg)	1.92	2.09	0.16#	8.3
Niacin (mg)	22.1	21.7	−0.4#	−1.8
Vitamin B-6 (mg)	1.78	1.73	−0.04#	−2.4
Folate (mcg)	262	267	5#	1.9
Vitamin B-12 (mcg)	5.03	5.17	0.14#	2.8
Calcium (mg)	802	789	−14#	−1.7
Phosphorus (mg)	1224	1226	2#	0.2
Magnesium (mg)	265	252	−12#	−4.6
Iron (mg)	15.4	15.2	−0.2#	−1.1
Zinc (mg)	11.1	11.1	*	0.2
Copper (mg)	1.2	1.2	*#	3.2
Selenium (mcg)	100.8	99.6	−1.2#	−1.2
Potassium (mg)	2630	2561	−69#	−2.6
Caffeine (mg)	175.8	131.0	−44.7#	−25.4
Theobromine (mg)	38	38.5	0.5	1.3
Individual fatty acids				
4:0 (g)	0.5	0.5	*	−0.1
6:0 (g)	0.3	0.3	*#	6.2
8:0 (g)	0.2	0.2	*#	12.0
10:0 (g)	0.4	0.4	*#	−3.2
12:0 (g)	0.8	0.7	−0.1#	−8.5
14:0 (g)	2.2	2.1	−0.1#	−5.1
16:0 (g)	13.9	13.5	−0.4#	−3.1
18:0 (g)	6.6	6.5	−0.1#	−1.7
16:1 (g)	1.4	1.2	−0.2#	−13.3
18:1 (g)	26.9	26.7	−0.2#	−0.8
20:1 (g)	0.1	0.2	*#	32.3
22:1 (g)	*	*	*#	−15.1
18:2 (g)	13.1	13.2	*	0.2
18:3 (g)	1.3	1.3	*#	2.8
18:4 (g)	*	*	*#	3.5
20:4 (g)	0.1	0.1	*#	2.1
20:5 (g)	*	*	*#	3.1
22:5 (g)	*	*	*#	2.3
22:6 (g)	0.1	0.1	*	0.1

#Indicates a significant difference at $P = 0.001$.
*Indicates a non-zero estimate too small to display.
[a]CSFII 1994–1996, 1998, 1-day data, $N = 21\,159$, excludes breast-fed children.
[b]Differences are based on values before rounding.

Table 2
Mean nutrient intakes for selected gender and age groups: old versus revised estimates[a]

Nutrients (unit)	Old	Revised	Difference[b, #]	%Difference
Children, 5 *years and under* ($N = 7818$)				
Cholesterol (mg)	173	167	−6	−3.6
Vitamin C (mg)	104	100	−4	−3.6
Riboflavin (mg)	1.76	1.82	0.07	3.9
Calcium (mg)	835	815	−20	−2.4
Magnesium (mg)	190	179	−10	−5.5
Potassium (mg)	1975	1915	−60	−3.1
Caffeine (mg)	9.2	8.9	−0.2	−2.6
16:0 (g)	10.5	10.2	−0.3	−2.7
Males, 20 *years and over* ($N = 5056$)				
Cholesterol (mg)	329	327	−2	−0.6
Vitamin C (mg)	109	102	−6	−5.9
Riboflavin (mg)	2.22	2.45	0.23	10.2
Calcium (mg)	884	870	−15	−1.7
Magnesium (mg)	326	310	−16	−4.9
Potassium (mg)	3197	3114	−82	−2.6
Caffeine (mg)	264.9	192.8	−72.1	−27.2
16:0 (g)	17.2	16.7	−0.4	−3.3
Females, 20 *years and over* ($N = 4816$)				
Cholesterol (mg)	212	210	−1	−0.6
Vitamin C (mg)	91	85	−5	−6.1
Riboflavin (mg)	1.57	1.74	0.16	10.4
Calcium (mg)	642	632	−10	−1.6
Magnesium (mg)	233	221	−12	−5.2
Potassium (mg)	2331	2272	−59	−2.5
Caffeine (mg)	202.7	148.9	−53.8	−26.5
16:0 (g)	10.9	10.6	−0.3	−3.2

#All differences were significant at $P = 0.001$.
[a]CSFII 1994–1996, 1998, 1-day data, excludes breast-fed children.
[b]Differences are based on values before rounding.

acid (8:0) and lauric acid (12:0). However, these individual fatty acids with the exception of palmitoleic acid (16:1) and lauric acid (12:0), are consumed in very small amounts, and account for less than 1% of total fatty acid intake (Ahuja et al., 1997). Small differences were seen for major fatty acids—oleic (18:1), palmitic (16:0), and linoleic (18:2).

Similar results were seen within gender/age groups, with some differences between adults and young children. Hence, the results were consolidated and selected nutrients and food components are presented in Table 2 for the following groups: children under 5, males age 20 and over and females age 20 and over. Higher differences were observed for cholesterol among children than adults; differences for other components were lower among children. The relative percent difference for caffeine intakes was much lower for children (−2.6%) as compared to adults (males: −27.2%, females: −26.5%). No marked differences were observed between males and females.

Table 3 presents the proportion of the population with usual intakes below the EAR for riboflavin, vitamin C, and magnesium, and below the AI for, calcium and potassium. Results are presented for different gender/age groups, as the dietary recommendation may differ. The proportion of population under EAR decreased for riboflavin, whereas the proportion of population under EAR or AI increased for vitamin C, magnesium, calcium, and potassium for most gender/age groups. The changes in the proportions were lower for children, as compared to adults. Data improvements had the most impact on vitamin C and magnesium assessments; based on the improved food composition database, about 4–7% more adults have inadequate intakes of vitamin C and magnesium from foods in the US population.

The contribution of selected food groups to the intake of riboflavin, vitamin C, magnesium, calcium, potassium and caffeine, ranked by the magnitude of the difference between the old and revised estimates are presented for all individuals in Table 4. Mean differences between the two estimates, and the significance of the differences are also given. Food groups that did not contribute much to the differences in the intake estimates of the nutrient/food component have not been included. For example, carbonated soft drinks are major food sources of caffeine; however the difference between their old and revised contribution is 0 mg and are therefore not included in Table 4. Likewise the following food groups are major contributors of vitamin C: citrus fruits and juices, non-citrus fruits and juices, and fruit drinks. However only the latter two contributed to the difference in the vitamin C intake estimates, and have been included in the table.

Overall changes in the food composition values for a few food groups appear to have had the most impact. These include fluid milk, coffee, tomatoes, and mixed dishes. Changes in the fluid milk led to significant changes in the intakes of all nutrients evaluated—riboflavin, vitamin C, magnesium, calcium, and potassium. The foods reported most frequently in the fluid milk food group include whole, reduced, low fat and non-fat milks. The food composition values for the above nutrients were updated for these milks in the SR, Release 16-1, and hence in the FNDDS, 1.0 and are mainly based on analytical data. These fluid milks were identified as key foods and targeted for analysis under NFNAP (Haytowitz et al., 2002). Similarly, changes in the tomato food group resulted in significant differences in the intakes of riboflavin, and vitamin C. This food group includes raw and cooked tomatoes, tomato catsup, paste, and sauce. All of these foods were identified as key foods for NFNAP analysis (Haytowitz et al., 2002). The riboflavin values for all these foods were updated and vitamin C values were also updated for raw tomatoes, tomato paste and sauce, based on new analytical data. Changes in food composition values for the coffee food group led to significant changes to the intakes of all nutrients and food components evaluated except vitamin C. Although coffee is not a good source of these nutrients, since it is so highly consumed, it represents a significant food source (US Department of Agriculture, 1998). The most consumed item in this food group, based on the number of times it was reported in CSFII 1994–1996, 1998, is 'regular coffee, made from ground'. The food composition values for ground coffee were also updated in the

Table 3
Proportion of population with usual intakes below EAR[a] or AI[b]: old versus revised estimates[c]

Group (years)	Riboflavin		Vitamin C		Magnesium		Calcium		Potassium	
	% Under EAR		% Under EAR		% Under EAR		% Under AI		% Under AI	
	Old	Revised	Old	Revised	Old	Revised	Old	Revised	Old	Revised
Males and Females										
1–3	0.0	0.0	0.1	0.3	0.2	0.2	12.4	13.4	94.8	96.1
4–8	0.0	0.0	0.4	0.7	0.6	0.8	40.1	42.6	99.4	99.6
Males										
9–13	0.0	0.0	1.5	2.6	14.7	17.5	83.1	84.5	99.0	99.4
14–18	1.8	1.4	18.1	22.0	62.3	66.1	65.6	66.6	90.9	92.8
19–30	3.2	2.6	32.7	36.5	57.3	61.2	59.6	61.3	92.2	93.2
31–50	2.7	1.5	37.9	42.5	58.8	65.3	64.4	66.3	90.1	91.9
51–70	5.0	2.7	36.5	41.4	68.3	75.0	89.8	90.5	94.5	95.6
71+	8.3	5.6	39.6	43.3	79.9	83.8	92.9	93.7	97.2	97.8
Females										
9–13	0.3	0.2	7.9	9.7	32.7	38.1	94.4	95.2	100.0	100.0
14–18[d]	4.4	3.8	22.2	25.1	89.3	91.7	97.6	98.1	99.9	100.0
19–30[d]	8.1	6.2	30.5	35.7	73.5	78.3	90.1	90.7	100.0	100.0
31–50[d]	6.6	3.8	35.0	39.7	69.6	76.6	91.5	92.4	99.8	99.9
51–70	7.5	4.1	29.8	35.0	69.9	76.7	97.9	98.1	99.8	99.9
71+	8.3	5.5	27.3	32.4	75.3	81.0	98.4	98.6	99.7	99.8

[a]Estimated average requirements.
[b]Adequate intakes.
[c]CSFII 1994–1996, 1998, 2-day data.
[d]Excludes pregnant or lactating women.

database based on analytical data for all nutrients, except caffeine values, which were based on manufacturers' data (US Department of Agriculture, 2004a). The food group 'mixed dishes' includes foods such as macaroni and cheese, pizzas, spaghetti with tomato sauce and hamburgers. Nutrient values were updated for a large number of these foods in the FNDDS, and changes may be due primarily to changes in the values for basic foods such as tomatoes, milk, and cheese. However, due to the number of foods in this food group, and the number of different SR foods used to derive their values, it is hard to pinpoint specific foods, which may have caused the changes in the estimates.

Other researchers have also compared nutrient intakes using different sets of food composition values (Hakala et al., 2003; Hels et al., 2003; Matsuda-Inoguchi et al., 2001; Vaask et al., 2004). These researchers observed differences in intakes of different nutrients. For example, Hels et al. (2003) observed significant differences in estimated dietary intakes for vitamin A and iron in rural Bangladeshi children and women, whereas Hakala et al. (2003) observed significant differences in the intakes of many nutrients including vitamin D, thiamin, and selenium. These results underline the importance of the reliable food composition values used in assessing dietary intakes. Hushof et al. (1996) used an updated 1993 food composition database to process food consumption data collected in 1987–1988 in Netherlands. They observed substantial reduction in fat intake. In their study, they applied corrections for artifactual changes in the nutrient databases to estimate changes in food choices. Similarly, Guenther et al. (1994) conducted a 'Bridging Study' to determine the effect of procedures and nutrient databases on intake estimates between USDA's Nationwide Food Consumption Surveys in 1977–1978 and 1987–1988. They identified the sources of artifactual differences and applied them to the earlier intake estimates. As a result, they revised the 1977–1978 estimates of nutrient intakes for iron, magnesium, and vitamins B6 and B12, based on improved food composition data.

The 'Bridging Study' helped the authors to conceptualize a process to track changes in the database and to enable analysis of previously collected data. This led to the development of the USDA Trends Analysis System. This system enables differentiation between real changes in foods versus data improvements. Improved data values replace the older values, whereas multiple records exist for real changes in the food supply. The system categorizes and tracks changes in nutrient values at the level of basic, ingredient food items, such as milk and cheese, which enables these analyses with relative ease (Anderson et al., 2001). In this study, changes in food portions and weights were not considered, so as to quantify only changes in food composition values. However, for analyses of temporal trends in food and nutrient intake, the dietary intake data need to be re-calculated with the revised food portions and weights also.

Table 4
Contributions of selected food groups to mean nutrient intake: old versus revised estimates[a]

Food group	Contribution (mg)		Difference[b, #] (mg)
	Old	Revised	
Riboflavin			
Coffee	*	0.11	0.11
Fluid milk	0.30	0.33	0.04
Tomatoes	0.01	0.02	0.01
Vitamin C			
Fluid milk	2	*	−2
Mixed dishes	8	7	−2
Fruit drinks	13	12	−1
Non-citrus fruits and juices	13	12	−1
Tomatoes	5	4	−1
Calcium			
Fluid milk	226	219	−7
Mixed dishes	127	124	−4
Yeast breads and rolls	50	55	4
Cheese	81	79	−2
Coffee	6	4	−2
Magnesium			
Coffee	13	6	−6
Fluid milk	25	20	−5
Mixed dishes	38	36	−2
Potatoes	15	16	1
Potassium			
Mixed dishes	399	377	−23
Coffee	130	117	−14
Fluid milk	290	277	−13
Non-citrus fruits	142	131	−11
Yeast breads and rolls	75	69	−6
Caffeine			
Coffee	121.2	78.5	−42.7
Tea	20.8	20.4	−0.4

#All differences were significant at $P = 0.001$.
*Indicates a non-zero estimate too small to display.
[a]CSFII 1994–1996, 1998, 2-day data, $N = 20\,108$, excludes breast-fed children.
[b]Differences are based on values before rounding, used for ranking food groups in the table.

4. Conclusions

Maintaining food composition databases in the constantly changing United States marketplace and an environment of improving analytical methods is a continuous and dynamic process. Improved food composition data, generated mainly by the NFNAP program, resulted in minor but significant changes in intakes for a majority of the nutrients and food components analyzed for CSFII 1994–1996, 1998. It led to changes in the proportion of population with inadequate intakes and in significant changes in the contribution of nutrients from different food groups. These artifactual changes require adjustments to the earlier intake estimates to improve comparability with more current intakes. The multi-year version of the Food and Nutrient Database for Dietary Studies enables quantification of differences in intakes due to improved food composition data or to changes in the food supply with relative ease.

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